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ABSTRACT

Two studies investigated the utility of a Cognitive-Behavior Change model in predicting adolescents' health behavior changes. The intervention specifically aimed at increasing students' knowledge of heart healthy habits, strengthening their beliefs, attitudes, and confidence regarding their ability to improve their health habits, and providing students with the skills to make the heart healthy decisions and behavior changes. Six hundred and sixty tenth-grade students in six high schools in communities covered by the Stanford Heart Disease Prevention Program's (SHDPP) Five City Project participated in the study. The socioeconomic status of the students in both studies ranged from low to upper middle class. Students were assigned to a treatment condition with the 5-6 session SHDPP intervention or a control (delayed treatment) condition. In both studies, students receiving the SHDPP intervention exhibited greater health improvements than did students in the control condition, as measured by pre-post self-report survey and behavioral observations. The most powerful predictors in changing adolescents' health behaviors were Behavioral Intentions, Knowledge, and Confidence components of the Cognitive-Behavior Change model. (Author/JD)

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PREDICTING HEALTH BEHAVIOR CHANGES IN ADOLESCENTS: A TENTH GRADE NUTRITION CURRICULUM

by

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Running Head: Predicting health behavior changes in adolescents

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PREDICTING HEALTH BEHAVIOR CHANGES IN ADOLESCENTS:

A TENTH GRADE NUTRITION CURRICULUM

Abstract

These studies investigated the utility of a Cognitive-Behavior Change model in predicting adolescents' health behavior changes. The model, which was used to guide the development of a health promotion intervention, is a synthesis of Bandura's social learning and self-efficacy theories and Roger's adoption-diffusion theory. The intervention specifically aimed at increasing students' knowledge of heart healthy habits, strengthening their beliefs, attitudes, and confidence regarding their ability to improve their health habits, and provided students with the skills to make the heart healthy decisions and behavior changes. 660 tenth-grade students in six high schools in communities covered by the Stanford Heart Disease Prevention Program's (SHDPP) Five City Project participated in the study. The first study was carried out in three high schools where the student population was predominantly white and came from middle to upper middle SES backgrounds. The second study was a replication of the first and was carried out in three high schools, one of which had a predominantly Hispanic student population; the second had a fairly balanced ethnic representation, and the third resembled the schools in the first study. In total, the SES of students in both studies ranged from low SES to upper middle SES. Students were assigned to a treatment condition with the 5-6 session SHDPP intervention or a control (delayed treatment) condition. In both studies, students receiving the SHDPP intervention exhibited greater health improvements than did students in the conrol condition, as measured by a pre-post self-report survey and behavioral observations. The most powerful predictors in changing adolescents' health behaviors were Behavioral Intentions, Knowledge, and Confidence components of the Cognitive-Behavior Change model.

Introduction

A review of the literature on adolescent knowledge and health practices reveals little unified documentation of what young people know about heart disease and its associated risk factors (Oswald, Katz, & Krekeler, 1980). Descriptive studies on these health factors have provided some insight into the decision-making and health behaviors of this age group (Miller, unpublished thesis; Oswald et.al, 1980). Yet, few have attempted to investigate what the student knows, what health practices the student currently engages in, and what, via a theoretically-based health intervention can be predicted about how these beliefs and practices can be altered or improved. Most descriptive data attempt to suggest a possible *content* for a health instruction program at the high school level on the prevention of cardiovascular disease. This study will attempt to address the question: what should be taught to adolescents if we wish to improve both their knowledge of heart disease and its associated risk factors *and* change their behavior to reflect heart-healthy practices? As such, the results of this study are intended to inform health instructional content and process.

The need for programs in the prevention of cardiovascular disease has been well-documented by medical and psychological researchers. Heart, lung, and blood diseases account for 55% of all deaths in the United States.

This figure is greater than all other causes combined. While heart, lung, and blood diseases do not manifest themselves until middle-age or later, the development of these diseases can actually begin during childhood and youth (Inter-Society Commission for Heart Disease Resources, Atherosclerosis Study Group, & Epidemiology Study Group, 1974). Thus, the school-age years are an important period in time to learn the knowledge, skills, and attitudes necessary to make and maintain health-promoting dietary changes.

While the long-term goal of many health interventions is the prevention of cardiovascular disease few interventions actively promote skill development in health-related decision making and problem solving (Holcomb, Carbonari, Ingersoll, Luce & Nelson, 1984). A fundamental question that arises in planning health interventions is: how do adolescents develop health behaviors? What factors influence how they go about making and solving health-related decisions and problems? Smoking studies on health risk attitudes, beliefs, and behaviors of high-school age students suggest that there is an age-related, negative relationship between beliefs, attitudes, knowledge, and health risk behaviors. While students are <u>aware</u> of the hazards of certain health risk attitudes and behaviors the strength of their beliefs <u>decreases</u> with age. Additionally,

these studies report an increase in certain health risk behaviors (e.g., smoking frequency and experimentation with smoking) for this age group (O'Rourke, Smith, & Nolte, 1983; Telch, Killen, McAlister, Perry, & Maccoby, 1982). Yet, an analysis of the specific relationship between beliefs, attitudes, knowledge, and healthy behavior remains an empirical question.

Few studies actually document the short-term effects of health interventions by using either self-report measures of behavioral change or behavioral observations. In those studies where careful documentation of knowledge, attitudes and behavior is undertaken, the first aim is usually to prove or disprove the efficacy of a particular health intervention in preventing cardiovascular disease in school-age children. An understanding of adolescent decision making processes and their development of health knowledge and belief systems is secondary to the analysis (Coates, Jeffery, & Slinkard, 1981;Holcomb et al., 1984). Therefore, not only does the immediate impact of the intervention on the development of heart-healthy behavior often go unrecorded, but our understanding of any further development or acquisition of heart-healthy skills in adolescence is severely limited.

Very often researchers and educators assume that persons in their late teens and early twenties are developing adult habits and life patterns.

We concur with this assumption and believe it is necessary to inform this group about present day knowledge of risk factors that can lead to heart disease (Mroczek, 1976). Nevertheless, we do not agree that knowledge is sufficient for predicting and explaining how adolescents develop adult health habits.

Research Question: A number of factors have been identified as important to the success of health education programs whose aims include changing the dietary habits of secondary students. Some of these factors are psychological in nature in that they focus on the students' characteristics and developme. tal levels. As such, various personality characteristics become important to producing health-enhancing behavior (Perry, 1983). In previous studies these have included students' interests, values, knowledge, body awareness, goals, internal locus-of-control, self-esteem, decision-making, and problem-solving skills (Coates et al., 1981). The objective of these two studies of tenth-grade adolescents was to research the relationships between and among various factors involved in the individual's development of health-enhancing behaviors. The general question addressed by both of these studies is:

What should be taught to adolescents if we wish to improve both their knowledge of heart disease and its associated risk factors *and* change their behavior to reflect heart-healthy practices?

More specifically, these studies will attempt to address the following questions in relation to the development of a heart health intervention:

What is the relationship between an adolescents' knowledge, attitudes, and beliefs about themselves as well as risk factors related to cardiovascular disease and their current health practices?

Which of these individual factors (i.e., knowledge, attitudes, beliefs) is affected by a heart health intervention, and how do each of these factors improve or increase the likelihood of developing heart healthy behavior?

Conceptual Framework: One of the drawbacks of most studies in adolescent health is that they are concerned with the evaluation of health interventions and only secondarily with adolescent behavior change. That is, the latter is used as a measure of success for the former. Additionally, few of the health interventions are developed from a strong theoretical base on how adolescents make decisions and behave in the health domain. Some researchers have adopted models which have their origins in other domains of social science research (Parcel, 1983). Parcel (1983) distinguishes between "distinct theories or single-concept models" and models for health related behavior that are based on multiple theories or conceptual approaches. An example of the former is communications theory (McGuire, 1981), or social learning theory (Bandura, 1977). By contrast, Perry and Murray (1982) offer a conceptual model for development of adolescent health behavior that is based on social learning theory, problem behavior theory, and attribution theory. The model includes two systems: 1) the environmental influences system and 2) the personal influences system. Their model is being applied to the development of intervention strategies which influence both of these two systems. Their work with adolescents has provided a growing body of theory-driven data on the effects of health promotion programs on

adolescent health behavior.

In the studies reported in this paper we utilized a conceptual approach to investigate the predictability of adolescent health behavior change. The model we use is called the Cognitive-Behavior Change model which is designed to guide our research of the relationships between and among individual decision-making and behavior change components. The environmental influences system of Perry's model is specified in the Cognitive-Behavior Change model as a perceptual and motivational component of the individual system, and as the individual's perception of social incentives and support for the activation and maintenance of specific behavioral repertoires. The Cognitive-Behavior Change Model is based on Bandura's social learning (1977a) and self-efficacy (1977b) theories and Roger's (1983) adoption-diffusion theory. These three theoretical perspectives have been integrated into the model which the Stanford Center for Research in Disease Prevention used and validated with adult populations (1977). The model identifies six psychological processes and behaviors which are involved in behavior change.

Insert Figure One about here

These include: 1) **AWARENESS** or health attitudes and beliefs, 2) **KNOWLEDGE**, 3) **MOTIVATION** or behavioral intentions, social incentive and support, and self-efficacy, 4) **SKILLS** or self-reported behavior and decision-making processes, 5) **ACTION** or observable health choices and behaviors, and 6) **MAINTENANCE**. These studies investigate the relationships between and among the first five of these individual components.

The **AWARENESS** component included ten items which asked students to rate how they felt about each of the ten statements on a scale from 1 (strongly agree) to 6 (strongly disagree). An example of one of the statements is "Making healthy meals or snacks is too much trouble." There were nine true-false items and six multiple choice items related to **KNOWLEDGE** about food and exercise facts. For example: "If you want to build muscle, you need to eat a lot of protein." The **MOTIVATION** component had eight items related to behavioral intentions and eight items relating to students' confidence that they could follow through with healthy eating and exercise behaviors. In the behavioral intentions measure, each item began with the stem "I intend to..." and asked students to rate the statements on a scale from 1 (definitely will not) to 4 (definitely will). A score of 5 constituted a students' report of intact behavior. For

example: " I intend to cut down on eating red meat to no more than three servings per week" (5- I don't eat red meat right now.) The confidence measure items began with the stem "For the next six months I could..." and asked students to rate their level of confidence on a scale from 1 (Not at all confident) to 5 (Very confident). A sample item from this component is "For the next six months I could drink only nonfat milk."

The **SKILLS** component included 26 items asking students to report on the frequency of their health behaviors during the last month. Students rated the frequency of their behavior using a scale from 1 (Daily or nearly every day) to 5 (Rarely or never). Two examples illustrate the content of these behavioral self-report items: 1) "(how often during the last month you ate) any fried food (eggs, bacon, french fries, fried chicken or fish." and 2) How often do you engage in vigorous physical activity (like running, swimming, biking, or racquet sports) for at least 20 minutes without stopping?

Hypotheses:

The following relationships in adolescent health behavior changes are suggested by the Cognitive-Behavior Change model:

A. The Knowledge, Awareness, and Motivation components of the Cognitive-Behavior Change model comprise an overall system of support

for behavioral change in adolescence which can be positively enhanced through the health intervention utilized in both studies.

1. The components are related to each other in the following ways:

a. Pre and post measures of Knowledge and Attitudes are separately and positively correlated with pre and post measures of Motivation.

b. Motivation will be the single best predictor of health behavior change.

B. Changes in measures of one component of the model due to participation in the health intervention will positively correlate with changes in measures of either of the other two components of the model (independent variables specified in measures section).

C. The best set of predictors of adolescent health behavior changes (Skills and Action) will include all three independent variable components of the Cognitive-Behavior Change model: Knowledge, Awareness (Attitudes) and Motivation (Confidence & Intentions).

Methodology

Sample:

The sample consisted of approximately 660 high school sophomores in one of three classroom settings: State Requirements Courses, Physical Education classes, or Health Education classes. Six high schools in communities covered by the Stanford Heart Disease Prevention Program's Five City Project participated in the two studies. The first study was carried out in three high schools where the student population was42-88% caucasian, from middle to upper middle SES backgrounds. The second study was a replication of the first and was carried out in three high schools, one who's student body was 82% Hispanic, from low to middle SES backgrounds; the second had a fairly balanced ethnic representation--52% Caucasian and 48% minorities (largely Asian and Hispanic); and the third resembled the schools in Study 1. Approximately 51% of the sample were males and 49% were females. 77% of students in the original sample received the entire intervention and were present during both the pre and post assessments. There was a 15% attrition rate in the sample from the pre-to-post assessments.

Design:

The two studies utilized a pre-test/post-test design for all measures. Tenth graders were systematically assigned by classes to treatment or control conditions. The studies involved three stages of analyses which were conducted at the class level and reflected a within and between school experimental design.

Measures:

The independent measures were assessed by a pre and post questionnaire. The questionnaire was self-administered and was usually completed within a twenty-minute period. The independent measures included students' pre, post, and difference scores of AWARENESS, KNOWLEDGE, and MOTIVATION. The dependent measures included the SKILLS and ACTION components of the Cognitive-Behavior Change model. These were assessed by self-report items on a pre and post questionnaire, a forced choice snack preference (controlled ACTION measure), and at school 4 in Study 2 by redemption of cafeteria/snackbar food preference coupons (natural ACTION measure). Inter-item correlations were

computed for each of the component composites derived from the survey. Reliabilities ranged from $p<.01$ to $p<.0001$ significance levels for all but the KNOWLEDGE composite score. Only students with both a pre and post score were iincluded in any of the analyses reported in this paper.

At the first stage of analysis, student t-tests and tests for analysis of variance using planned contrasts were run on all measures to determine pre-to-post changes in health measures and to determine the differences between treatment and control groups. The second stage of analysis involved the correlation of each of the measures at pre and post administrations, to test the relationships between the various measures suggested by the Cognitive-Behavior Change model. In the final stage of analysis forward stepwise regression procedures were employed to test the hypotheses that the best predictors of adolescents' health behavior change (SKILL and ACTION scores) include pre and post scores on all of the independent measures: KNOWLEDGE, AWARENESS, and MOTIVATION.

Procedures:

The health promotion intervention consisted of 5 or 6 sessions taught within a 2-3 week period by either a masters level health expert or the regular classroom teacher. The sessions were 50 minutes long and focused

on dietary and exercise information as well as cognitive behavior change strategies for modifying current exercise and dietary patterns. The program's informational component follows SHDPP's dietary, nutritional, and exercise recommendations which stress a diet high in complex carbohydrates and low in salt, sugar, and saturated fats, and encourages aerobic exercise 3-4 times a week for at least 20 minutes.

The program's activities and delivery component aimed at the cognitive behavior change strategies that adolescents are predicted to use in changing their health behavior. These were constructed from the Cognitive-Behavior Change model. These included contracting for food and exercise changes, keeping a diary of food choices, selecting "heart healthy" food labels and advertisements, and role-playing. A nutrition and exercise self-appraisal form was filled out during the first class session as baseline information for the student (session 1). In Study 2 a film called "Choices" was shown to students, depicting the consequences of unhealthy habits, influential factors in the lives of adolescents (peers, advertisements, family role models) and touching on the number of related decisions with which this age group is faced. The motivational message of the film: You <u>can make</u> informed choices--the <u>choices are yours</u> to make.

The intervention objectives included: de-mythifying food-related

beliefs revealed in a formative evaluation study with this population (Miller, 1985, unpublished thesis) (sessions 1 and 2); changing dietary behaviors such as food selection and consumption through self-monitoring strategies such as goal setting, problem solving, and behavioral rehearsal and feedback (session 3 & 4); increasing awareness of the barriers to making healthy behavior changes (e.g. pressures from peers, advertising and media, food availability in community and at home) (sessions 4 & 5); and providing students with successful and healthy experiences against which to test their newly acquired knowledge, beliefs, and behaviors (sessions 1-5). A heart-healthy food tasting occurred after every session. A four-step home-based nutrition kit was distributed as a take-home assignment to share with the students' families. Other homework assignments promoted practice of relevant dietary behaviors outside the classroom.

In Study 1 sophomores enrolled in the State Requirements courses (SRC) in two of the high schools received the intervention with the home-based nutrition kit (7 classes; N- 143). In the third high school, students enrolled in physical education classes received the intervention without the kit (3 classes; N- 51).

In Study 2, all participants in the treatment condition received the health promotion intervention with the kit since results from Study 1 indicated that use of the home-based kit as a social support increased students' scores on heart healthy behavior measures. In this study, eight (8) health education classes (N= 199) were assigned to the treatment condition. In Study 1 six classes (N= 150) were assigned to the control condition, and in Study 2, two classes (N=37) were assigned to the control condition. In each study one of the control cohorts (one class) served as a long-term control group for follow-up studies. The other controls received the treatment after the post-testing period.

Results

Basic descriptive data on pre and post means, significance levels of pre to post changes, and one-way Anovas indicate that students participating in the health intervention with the SHDPP heart healthy nutrition curriculum showed significant increases in measures of knowledge ($p<.0001$), skills ($p=< .001$), and motivation ($p=< .001$). The efficacy of the curriculum was demonstrated for nearly all of the components included in the Cognitive-Behavior Change model as contributing to changes in adolescent health behavior.

An examination of the relationships between the various components of the model reveals a significant relationship between pre and post measures of awareness (attitudes) and motivation (confidence and intentions) when the curriculum is used with the kit. When the curriculum is used without the kit, there is a significant relationship between post measures of awareness and motivation (see Table 1). Correlations ranged from .37 to .68 ($p<.001$) in Study 1 and from .32 to .51 ($p<.001$) in Study 2. Knowledge and motivation were significantly correlated in all pre and post assessment groups except on pre measures in the treatment plus kit condition in Study 1. The correlations ranged from .18 ($p<.05$) to .67 ($p<.001$) in Study 1 and .20 ($p<.01$) to .34 ($p<.001$) in Study 2. The hypothesis that students' levels of motivation are related to their heart healthy knowledge and attitudes is confirmed almost without exception by these data.

In the correlations of pre and post measures of knowledge and awareness, all post measures are positively and significantly correlated for these two components. Correlations in both studies range from .20 ($p<.01$) to .55 ($p<.001$). The relationship between students' knowledge of heart healthy facts and their beliefs and attitudes about how these facts can contribute to heart health is significantly enhanced by participation in the health intervention. None of the pre measures of these two

components were significantly related.

As hypothesized, knowledge and awareness are positively and separately correlated with pre measures of motivation. However, the post measures indicate that all of the independent components of the Cognitive-Behavior Change model are related to one another. These data provide empirical evidence for the theoretical construction of a behavioral change system for adolescents. In addition, they verify the power of health interventions (such as the SHDPP curriculum) as a means for strengthening the relationships between the components of the overall behavior change system, thereby increasing the likelihood of behavior change.

The data on the correlations between difference scores are reported in Table 2. The second hypothesis states that positive increases in one component of the model will be related to increases in each of the other two components of the model (for independent variables only). The pattern of relationships in each study, and in the two conditions (with and without the kit) appears to be idiosyncratic. In the conditions using the kit, increases in knowledge are associated with increases in attitudes and intentions ($p<.05$) for Study 1, whereas in Study 2 increases in knowledge are only significantly correlated with increases in confidence ($p< .01$).

The significant variable in Study 1 that is correlated with increases in the other 2 components of the model is intentions. In Study 2 it is confidence. Correlations ranges from .19 ($p<.05$) to .25 ($p<.001$). The strongest and most significant relationships were found in Study 2 where 1) the curriculum was used with the kit, 2) the curriculum was taught in health education classes, and 3) the teachers were trained in health as well as physical education. The second hypothesis was not confirmed for all variables, but instead seemed to hold only for the motivation component of the Cognitive-Behavior Change model.

The last hypothesis, like the second, states that all three independent variables in the model will be included in the best set of predictors of adolescent health behavior change. Therefore, the analysis will yield a regression equation which includes measures of knowledge, attitudes, confidence, and intentions. The data for this hypothesis is reported in Table3 and 4. Again, between Study 1 and Study 2, different sets of predictors emerge. However, the three best and most consistent predictors of post behavior changes in both the skill and action components of the model are knowledge, confidence, and intentions. These three variables predict scores in skills or self-reported behavior (R-sq=.17-.43, $p<.0001$) and action or behavior observed in a natural setting (R-sq= .15,

p<.05) when the curriculum is used with the kit. The greatest amount of variance was accounted for by intentions in the curriculum without the kit condition (R-sq= .43, p<.0001). The single most important predictor of adolescent health behavior scores is the intentions measure. This variable is present in all sets of predictors for all conditions, for both pre and post measures used to predict post skill and action measures. Therefore, the hypothesis that motivation (of which intentions is one of the two measures) is the single best predictor of adolescent behavior change is upheld, but the last hypothesis is not confirmed by the data on best sets of predictors.

Discussion

The results of these two studies reflect a small but solid step toward investigating and documenting the psychological processes involved in producing adolescent health-related behavior. The data clearly point to the importance of motivational factors in predicting or increasing healthy behavior. The verbal intentions and commitments adolescents are willing to make about what health behavior they are likely to engage in seems central to the power of the Cognitive-Behavior change model. From these data we can speculate that theoretical models which only address adolescents' health knowledge and health belief systems will fall short of

predicting and improving adolescents' health behavior. Knowledge about food and exercise facts is necessary, but not sufficient for making the appropriate healthy choices and behavior changes.

The idiosyncratic patterns revealed between and across various conditions in which the health intervention was implemented suggest that the social incentives and support component of the model strongly influences adolescent health behavior changes. The types of social support and structures that promote healthy behavior have been documented with younger children. The family or parents of elementary school children appear to play an important role in getting children to adopt healthier eating and exercise habits (Coates, Jeffery, & Slinkard, 1981; Flora, Loesch-Griffin, Melcher Benjamin, Farquhar, & Fortmann, in preparation). Smoking prevention programs aimed at sixth and seventh grade students appear to be most successful when they incorporate a peer leadership component (Telch et al., 1981). In adolescence the degrees and sources of influence on health behavior need to be well documented before decisions about what should be taught can be finalized. The design of these studies did not attempt to analyze the social incentives and support component of the model, therefore no immediate conclusions can be drawn regarding the effects of various teaching conditions, settings, and characteristics.

The regression methods employed in these studies were selected to determine which of the components from the Cognitive-Behavior Change model represent the best set of predictors of adolescent health behavior. We recommend that future studies of adolescent health behavior change attempt to separate or partial out the interaction effects of the various psychological processes involved in health-related decision making and problem solving. In this respect it would be helpful to apply partial correlation and regression analysis methods to the data. This finer grain of analysis may provide some insight into the specific nature of the adolescent's cognitive-behavioral change system and to the particular ways (directions) specific psychological processes influence one another during the decision making process.

In conclusion, the results of these studies support health interventions which address skill development, confidence building, and behavioral contracts as well as heart healthy facts about food and exercise. Two questions which remain unanswered by these studies include: 1) by whom and in what setting(s) should a heart health intervention be taught? and 2) how or in what sequence should various curricular activities be set to maximize the development of healthy behavior in adolescence?

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A Cognitive-Behavior Change Model

for Predicting Adolescent Health Behavior Changes

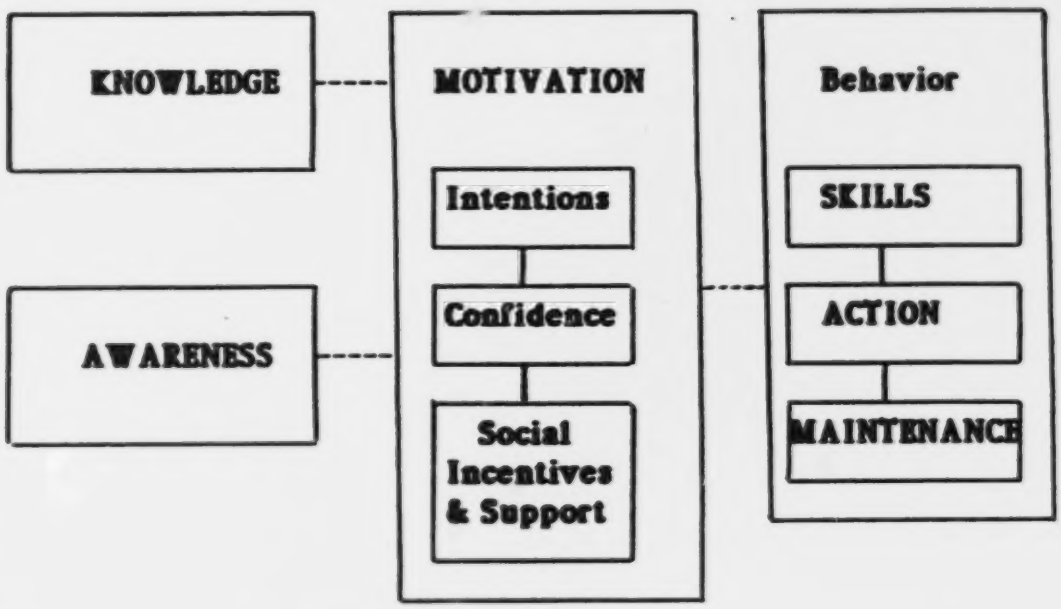

FIGURE 1

Table 1

Relationships Between Components of the Cognitive-Behavior Change Model

Studies 1 & 2

Correlations Between Pre Measures and Post Measures of Knowledge, Awareness (Attitudes), & Motivation (Confidence & Intention)

:

Variable-Pair Name:	Pre Kit/Pre No Kit 1	Pre Kit/Pre No Kit 2	Pre Kit/Pre No Kit 1	Post Kit/Post No Kit 1	Post Kit/Post No Kit 2	Post Kit/Post No Kit 1
Knowledge-Attitude	.15	.12	.22	.28**	.20**	.55***
Knowledge-Confidence	.16	.23**	.43***	.18*	.34***	.62***
Attitude-Intention	.45***	.51***	.13	.56***	.39***	.64***
Intention-Confidence	.53***	.46***	.70***	.47***	.52***	.85***
Intention-Knowledge	.15	.20**	.45***	.41***	.30***	.67***
Confidence-Attitude	.37***	.45***	.20	.43***	.32***	.68***

*p<.05
**p<.01
***p<.001

Table 2

Relationships Between Components of the Cognitive-Behavior Change Model

Studies 1 & 2

Correlations Between Difference Scores of Knowledge, Awareness (Attitudes), & Motivation(Confidence & Intention)

:

Variable-Pair Name:	Curriculum With Kit/ Curriculum W/O Kit 1	2	1
Knowledge-Attitude	.19*	-.01	.26
Knowledge-Confidence	-.01	.22*	.32*
Attitude-Intention	.21*	.19*	.08
Intention-Confidence	.12	.24***	.02
Intention-Knowledge	.20*	.04	.12
Confidence-Attitude	.10	.25***	.43*

*p<.05
**p<.01
***p<.001

Table 3

Predicting Changes in Adolescent Health Behavior
Contributions of the Cognitive-Behavior Change Model
Study 1

Best Set of Predictors for Post-Skill measures:

Curriculum With Kit

Pre-Measures:			
Variable Name:	**β-Values**	**Standard Error**	**F**
R-squared-.24***			
Intercept	1.68		
Intentions	.15	.04	11.14**
Attitude	.20	.06	11.20**
R-squared = .37***			
Post-Measures:			
Intercept	1.41		
Confidence	.11	.04	6.3*
Intentions	.34	.05	43.3***

Best Set of Predictors for Post-Skill measures:

Curriculum Without Kit

Pre-Measures:			
Variable Name:	**β-Values**	**Standard Error**	**F**
R-Squared- .35***			
Intercept	2.28		
Intentions	.28	.06	25.94***
R-Squared- .43***			
Post-Measures:			
Intercept	2.11		
Intentions	.33	.05	37.64***

*p<.01,**p<.001, ***p<.0001

Table 4
Predicting Changes in Adolescent Health Behavior
Contributions of the Cognitive-Behavior Change Model
Study 2

Best Set of Predictors for Post-Skill measures:

Curriculum With Kit

Pre-Measures:			
Variable Name:	**β-Values**	**Standard Error**	**F**
R-Squared= .17***			
Intercept	2.08		
Knowledge	.03	.01	6.46*
Confidence	.08	.04	4.34
Intentions	.14	.04	9.82*

Post-Measures:			
R-Squared= .19***			
Intercept	2.0		
Intentions	.29	.04	44.10***

Best Set of Predictors for Post-Action measures in a natural setting:

Curriculum With Kit

Pre-Measures:			
Variable Name:	**β-Values**	**Standard Error**	**F**
Intercept			
None at a level of significance			

Post-Measures:			
R-Squared= .15 p<.05			
Intercept	1.32		
Knowledge	-.05	.03	2.26
Confidence	.14	.09	2.4
Intentions	-.25	.13	3.6

*p<.01, **p<.001, ***p<.0001